ROUTING AND RECORD SHEET

SUBJECT: (Optional)

OIT Standard for Graphics Interchange

FROM: Edward J. Maloney Director of Information Technology	EXTENSION	NO.	
		DATE 1/6/88	DDA/REG LOGGED

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. DDA 7D18 Hqs	2 0 JAN 198			FYI
2. Executive Director 7E12 Hqs	2 6 JAN 1988	2 8 JAN 1988		This seemingly small point has been brought to my attention because I maintain a lively interest in computer _standards_ ... an important activity in my own because it helps to bring all of those working information technology issues together. I hope you will add my thanks to yours ... to all of those who helped get this particular standard established
3. DDA — Rae				
4. D/OIT				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

> This seemingly small point has been brought to my attention because I maintain a lively interest in computer _standards_.... an important activity in my view because it helps to bring all of those working information technology issues together. I hope you will add my thanks to yours... to all of those who helped get this particular standard established.
>
> James H. Taylor

FORM 610 USE PREVIOUS EDITIONS
1-79

U.S. Government Printing Office: 1985—494-834/49156

ERNAL USE ONLY

OIT-0006-88

0 6 JAN 1988

MEMORANDUM FOR: Executive Director

VIA: Deputy Director for Administration

FROM: Edward J. Maloney
                 Director of Information Technology

SUBJECT: OIT Standard for Graphics Interchange

    1. The attached OIT Standard for Graphics Interchange is hereby adopted.
It was developed by the Architecture Working Group, approved by the
Information Technology Management Board and the Customer/Standards Committee
has advised that it be adopted.

    2. This standard provides for the creation of a graphic on one computer
system or workstation and the modification or printing of that graphic on
another system. We believe that this capability will facilitate the sharing
of information between Agency components who use different computer systems.

    3. The adopted standard is the Computer Graphic Metafile, an
international standard that has been formally adopted by appropriate U.S. and
international standards bodies. A wide variety of products already support
this standard, and it continues to gain increasing support.

    4. OIT-installed software that does not support this standard will be
upgraded to incorporate CGM support at the earliest opportunity.

STAT

Edward J. Maloney

Attachment:
  As stated

OIT Standard
Graphics Interchange Format

01/06/87

1. Summary

1.1 This is the OIT Standard for the form of graphics exchanged between mainframes and workstations and among different types of software running on the mainframes and workstations. The term "graphics" refers to those entities that can be easily and fully described by drawing primitives such as lines, polygons, colors, and filled areas. This standard does not cover the storage or interchange of graphics in a raster format, such as images, video, or "paint" type graphics. The standard is Computer Graphic Metafile (CGM) as defined by the International Standards Organization (ISO) and the American National Standards Institute (ANSI).

1.2 The need for this standard is discussed, applicable potential standards are reviewed, and the recommended standard is presented. The applicability of the standard and OIT implementation responsibility are described.

2. Need for this Standard

2.1 Currently, for each graphics software package installed on OIT computer systems, device interfaces must be obtained from the vendor and installed and tested for each graphics device to be used--a time-consuming, costly process. In addition, no standard means exists for graphics interchange among graphics-capable software packages from different vendors. Finally, no standard method exists to create graphics on hardware from one vendor and transfer them for editing and printing on hardware from another vendor.

2.2 The adoption of a standard graphics interchange format will ease the requirement to install and maintain interfaces in each software package for each device on which one wants to display graphics. A program to translate the standard interchange format into the specific protocol for each supported device can be installed. Then, any graphics software that can produce a graphic in the standard interchange format, can display the graphic on any device supported through the translator program. For example, with a standard graphics interchange format and with standard-compliant translator software in place, graphics software on a PC could produce hardcopies on high-quality, high-cost, shared devices such as laser printers or color film recorders attached to OIT's mainframe computers.

2.3 Graphics could also be interchanged among software packages to take advantage of the strengths of a particular package. For example, when a software package such as a DBMS or statistical

1

OIT Standard
Graphics Interchange Format

package produces low-quality graphics as an adjunct to its main abilities, that low-quality graph can be transferred to a graphics editor software package for enhancement. Using this graphics interchange format, one could even transfer graphics directly into a desktop publishing package. This eliminates the need to first produce a hardcopy of the graphics and then scan them into an image format file before importing them into the desktop publishing package.

3. Candidate Standards

3.1 The only viable candidate standard is the Computer Graphics Metafile (CGM). CGM became the graphics interchange format standard of both ANSI and ISO in late 1986. Already, dozens of vendors of graphics software packages that run on computers of all sizes can store, retrieve, or display graphics in the CGM format. Many additional vendors are adding CGM interfaces to their products. Not only is CGM becoming the storage method of choice for graphics software vendors, it is also receiving growing support by vendors of other software that needs to import pictures, such as desktop publishing software. CGM is also being used as the graphics interchange format to be included in other standards currently being drafted under the auspices of ANSI, such as the Computer Graphics Interface (CGI). It is the vector graphic content architecture specified in the Office Document Architecture and Interchange Format Standard being developed by the ANSI Text and Office Systems Committee, X3V1. ANSI and ISO are also drafting extensions to CGM to include audit trails (session capture mechanisms), archive files, and raster graphics. The Technical and Office Protocol (TOP version 3.0) administered by the Society for Mechanical Engineers also includes CGM.

3.2 The CGM defines a file format suitable for the storage and retrieval of graphics. The file format consists of an ordered set of elements that can be used to describe graphics in a completely device-independent and software-independent way. One or more graphics can be stored in a single metafile. The metafile is designed in such a way that, in addition to sequential access to the whole metafile, random access to individual graphics is well defined. Thus, the graphics are completely independent, one from another, and their access or display does not depend upon the order in which they are stored.

3.3 Two other candidate standards exist for the storage and retrieval of graphics. These are: IBM's Graphic Data Format and Computer Associates' DISSPOP Metafile.

3.3.1 IBM's Graphic Data Format is commonly used for storage and retrieval of graphics on IBM mainframes. Graphic Data Format files, however, can be created and retrieved only

2

through the use of IBM's proprietary Graphical Data Display
Manager (GDDM), which runs only on IBM mainframe computers.
Since this graphics file can only be processed on a mainframe
computer using proprietary software from a single vendor, it
satisfies neither the requirement to allow free interchange
of graphics between mainframes and workstations, nor the
requirement to interchange graphics among software from
various vendors.

3.3.2 The DISSPOP Metafile is a proprietary graphics
interchange format from Computer Associates, Incorporated
(formerly Integrated Software Systems Corporation, ISSCO).
The DISSPOP Metafile is the current de facto standard for the
storage, retrieval, and transfer of graphics among OIT's
mainframe computers running the VM and MVS operating systems.
Computer Associates also has software that will read and
write DISSPOP Metafiles on an IBM AT-compatible workstation.
Since the DISSPOP Metafile format is proprietary, it cannot
be adopted as a standard, because its adoption would preclude
the use of graphics software from other vendors and make the
Agency totally reliant upon Computer Associates graphics
software.

4. Standard

4.1 The Computer Graphics Metafile, as defined by the American
National Standards Institute standard X3.122-1986, is the standard
format for the interchange of graphics. Since CGM has been adopted
by ANSI and ISO it is a stable and well documented standard
available to all graphics product vendors.

4.2 The CGM standard specifies three encodings of the metafile
semantics: Binary, Character, and Clear-text. The Binary encoding
is the most compact, requires the least resources to generate and
translate, but is not well suited for exchange between computers
of different instruction sets and word lengths. The Character
encoding uses standard ASCII character sets, making it suitable
for transmission across networks. However, it is not easy to
modify and the files are marginally bigger and more expensive to
create and translate than Binary encoded files. Clear-text encoded
CGMs are also quite suitable for transmission across networks, and
they can be modified in a text editor by users who understand the
format. Clear-text encoded CGMs, however, are much larger and
more resource intensive to create, translate and transmit across
networks than either Binary or Character encoded CGMs.

5. Test Standard

5.1 The National Bureau of Standards (NBS) is currently preparing
a routine to read a CGM file and validate that its content and
syntax conform to the standard. In addition, NBS is generating an

OIT Standard
Graphics Interchange Format

application profile to validate that the CGM generators and interpreters contained within vendor products conform to the standard. When these routines are available, they will be used to verify a vendor's compliance with CGM. Until those routines are available, compliance will be judged by the ability of a candidate CGM to be converted, processed and displayed without loss of graphics information by the CGM processors provided by Computer Associates, Incorporated.

6. Applicability of the Standard

6.1 This standard is applicable to all transfers of graphics among OIT-supported single-user workstations, minicomputers, and mainframe computers. The only graphics software that will be sanctioned and fully supported by OIT are those that implement a CGM storage and retrieval facility.

6.2 This standard also applies to all other software systems that include graphics as part of their function, such as desktop publishing software. Although desktop publishing software may not create graphics and thus need not write graphics in CGM format, the package must be able to import graphics in CGM format for inclusion into compound documents.

6.3 This standard restricts the acquisition of hard-copy devices, such as printers and plotters, and terminals that are to be connected to OIT computer systems for the purpose of displaying graphics, to those that can display and print graphics in CGM format. Every graphics device acquired must either be equipped to display graphics stored in CGM, or an interface that allows the device to display CGM graphics must be written or purchased and installed before the device can be connected to OIT systems.

6.4 Existing software packages capable of producing graphics and hardware capable of displaying graphics are exempt from immediate compliance with this standard. When the vendor offers a CGM capability as part of an upgrade to any such exempt hardware or software, then the exemption expires. At that time, the CGM capability must be acquired and installed, bringing the exempt hardware or software into compliance.

6.5 This standard applies only to graphics that represent the final picture that a program has created. It is not applicable where a session capture metafile is required to provide an audit trail of the activity performed during a session used to generate a graphic, as, for example, with Computer Aided Design applications. This standard does not cover the storage or interchange of graphics in a raster format.

6.6 Native format file is permitted in addition to CGM. Native format is any file created by graphics software for internal use

OIT Standard
Graphics Interchange Format

as a graphics storage and retrieval mechanism. Typically, native format files are undocumented and not readily translatable into other formats. OIT will support native format exchange of graphics only between graphics software packages of the same type.

7. Effective Date

7.1 This standard is effective immediately.

8. Implementation

8.1 All OIT components are responsible for conforming to this standard during the selection of vendor software and hardware for OIT support and during the development and installation of new graphics systems.

8.2 OIT will establish appropriate validation criteria and provide a point of contact for certifying product compliance with this standard.

8.3 OIT will maintain a list of hardware and software that is known to conform with this standard.

8.4 OIT will furnish programs to transform CGM files among the three encodings: Binary, Character, and Clear-text.

8.5 OIT will furnish CGM compliant device interfaces to support the drawing of graphics in CGM format on all OIT-supported graphics-capable devices.

8.6 OIT will contact vendors of graphics-capable software and hardware currently installed, but not CGM compatible, to seek vendor support for CGM in future releases of the products.

9. References

9.1 Computer Graphics Metafile, ANSI Standard Number X3.122-1986, American National Standards Institute, New York, 1986.

9.2 Information Processing--Computer Graphics--Metafile for Transfer and Storage of Picture Description Information, ISO Standard Number 8632/1-4, International Standards Organization.

RNAL USE ONLY

**Deputy Director
for Administration**

DDA 88-0278

4 February 1988

8 FEB 1988
OIT/TRIS
LOGGED

NOTE FOR: Director of Information Technology

SUBJECT: OIT Standard for Graphics Exchange

Ed,

Great job on the OIT Standard for Graphics Exchange. Please pass on my thanks to members of the Architecture Working Group and any others who participated in this effort. It responds to a long-standing need to bring some type of consistency and order to this process.

You probably know that the ExDir maintains a keen interest in computer standards, and he asked that I pass on his thanks as well.

STAT

R. M. Huffstutler

Att

ADMINISTRATIVE-INTERNAL USE ONLY

Date **09 FEB 1988**

	Action	Info	Seen
D		✓	
DD		✓	_l_
Nancy			
Rose			
Mary			
C/CSG			
C/DG			
C/EG			
C/MG			
C/OG			
D/CSPO			
SADE			
C/A&TPS		✓	_Dir_
C/TSS			

COMMENT:

STAT

to DD/OET

_____ was the author of
The Standard — he should have some
recognition too.
                    xOcR